SECTION A. TECHNICAL NOTES

These technical notes include information on sampling and weighting, survey methodology, sampling and nonsampling errors, and data comparisons to previous National Survey of Recent College Graduates (NSRCG) cycles and Integrated Postsecondary Education Data System (IPEDS) data. For a more detailed discussion of survey methodology, readers are referred to the NSRCG:95 Methodology Report.

OVERVIEW

The NSRCG:95 is sponsored by the National Science Foundation (NSF), Division of Science Resources Studies (SRS). The NSRCG is one of three data collections covering personnel and graduates in science and engineering. The other two surveys are the National Survey of College Graduates (NSCG) and the Survey of Doctoral Recipients (SDR). Together, they constitute the NSF's Scientists and Engineers Statistical Data System (SESTAT). These surveys serve as the basis for developing estimates and characteristics of the total population of scientists and engineers in the United States.

The first NSF-sponsored NSRCG (then known as New Entrants) was conducted in 1974. Subsequent surveys were conducted in 1976, 1978, 1979, 1980, 1982, 1984, 1986, 1988, 1990, 1993, and 1995. The initial survey collected data on only bachelor's degree recipients, but all subsequent surveys included both bachelor's and master's degree recipients.

For the NSRCG:95, a sample of 275 colleges and universities was asked to provide lists of eligible bachelor's and master's degree recipients. From these lists, a sample of 21,000 graduates (13,893 bachelor's and 7,107 master's recipients) was selected. These graduates were interviewed between May 1995 and March 1996. Computer assisted telephone interviewing (CATI) served as the primary means of data collection. Mail data collection was used only for those who could not be reached by telephone. The unweighted response rate for institutions was 97 percent, and the unweighted response rate for graduates was 86 percent. The weighted response rates were 94 and 83 percent, respectively.

The NSRCG questionnaire underwent few revisions for the 1995 survey. All revisions were done in coordination with similar revisions to the other SESTAT surveys. Topics covered in the survey include:

- Educational experience before and after obtaining the sampled degree;
- Graduate employment characteristics including occupation, salary, unemployment, underemployment, and post-degree work-related training;
- Relationship between education and employment; and
- Graduate background and demographic characteristics.

SAMPLE DESIGN

The NSRCG used a two-stage sample design. In the first stage, a stratified nationally representative sample of 275 institutions was selected with probability proportional to size. There were 102 self-representing institutions, also known as certainty units. For each institution, the measure of size was a composite related to both the number of graduates and the proportion of these who were black or Hispanic. The 173 noncertainty institutions were implicitly stratified by sorting the list by type of control (public, private), region, and the percentage of degrees awarded in science or engineering. Institutions were then selected by systematic sampling from the ordered list.

The second stage of the sampling process involved selecting graduates within the sampled institutions by cohort. Each sampled institution was asked to provide

lists of graduates for sampling. Within graduation year (cohort), each eligible graduate was then classified into one of 42 strata based on the graduate's major field of study and degree level. However, due to the small numbers of Native Americans, all Native Americans who were identified on the graduate lists were put into one stratum for each cohort and sampled with certainty. While race was not an explicit stratification variable, black and Hispanic graduates were assigned a measure of size equal to three, while non-black/non-Hispanic/non-Native American graduates were assigned a measure of size equal to one. This method had the same effect as oversampling black and Hispanic graduates by a factor of three. Table 1 lists the major fields and the corresponding sampling rates by cohort and degree. These rates are overall sampling rates for the major field, and include the institution's probability of selection and the within-institution sampling rate. To achieve the within-institution sampling rate, the overall rate was divided by the institution's probability of selection. The sampling rates by stratum were applied within each eligible, responding institution, and resulted in sampling 23,771 graduates.

Subsampling of Nonrespondents

Using the sampling rates in Table 1, a total of 23,771 graduates were sampled, rather than the 21,000 that were planned. Therefore, a subsample was selected to reduce the sample to the target of 21,000. Since at the time of subsampling most of the sampled graduates had been processed to some extent and many had completed interviews, the subsample was selected from the cases that were currently nonrespondents and in tracing to find a telephone number or address. All tracing cases were eligible except for bachelor's degrees with major fields of Other Physical Sciences and Aero/Astro Engineering. The sample sizes in these fields were substantially less than what was originally targeted, so they were excluded from the subsampling process. There were 7,971 cases eligible to be subsampled and the target sample size was 5,200. Thus, 2,771 cases were not subsampled, and data collection on these cases ceased immediately. The file of cases eligible for subsampling was sorted by cohort, degree, major sampling category, and school; the same sorting procedure used in the full sample. An equal probability sample was selected. Table 2 provides the final sample sizes after subsampling.

Table 1. Major fields and corresponding sampling rates, by cohort and degree

Major field of study	1993 bachelor's rate	1993 master's rate	1994 bachelor's rate	1994 master's rate
Computer sciences	0.0163	0.0262	0.0159	0.0255
Mathematics/statistics	0.0185	0.0492	0.0194	0.0505
Environmental, agricultural & forestry sciences	0.0315	0.0754	0.0305	0.0648
Biological sciences	0.0098	0.0383	0.0092	0.0371
Chemistry	0.0278	0.0902	0.0284	0.0876
Other physical sciences, earth sciences, geology, oceanography	0.0460	0.0938	0.0425	0.0969
Physics/astronomy	0.0572	0.0859	0.0598	0.0816
Economics	0.0169	0.0596	0.0180	0.0544
Political science	0.0103	0.0419	0.0105	0.0382
Psychology	0.0101	0.0247	0.0098	0.0236
Sociology/anthropology	0.0129	0.0693	0.0118	0.0654
Other social sciences	0.0164	0.0444	0.0168	0.0404
Aero/astronautical engineering	0.0906	0.1265	0.0910	0.1200
Chemical engineering	0.0522	0.1144	0.0467	0.1138
Civil engineering	0.0298	0.0506	0.0276	0.0485
Electrical engineering	0.0169	0.0273	0.0176	0.0272
Industrial engineering	0.0643	0.0845	0.0662	0.0802
Mechanical engineering	0.0212	0.0516	0.0205	0.0509
Other engineering	0.0385	0.0375	0.0386	0.0356
Unknown major	0.0098	0.0247	0.0092	0.0236

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995

Table 2. Sample sizes after subsampling, by major field of study and degree

Tabulation category	Major field of study	1993 bachelor's sample size after subsampling	1993 master's sample size after subsampling	1994 bachelor's sample size after subsampling	1994 master's sample size after subsampling
	Total	6,873	3,512	7,020	3,595
11	Computer sciences	409	235	407	241
12	Mathematics/statistics	318	185	316	186
21, 23	Environmental, agricultural, and forestry sciences	300	185	341	184
22	Biological sciences	560	217	618	229
31	Chemistry	263	151	254	174
32, 34	Other physical sciences, earth sciences, geology, oceanography	194	144	204	155
33	Physics/astronomy	245	160	242	163
41	Economics	414	154	389	161
42	Political science	549	214	542	202
43	Psychology	792	307	818	335
44	Sociology/anthropology	440	174	468	181
45	Other social sciences	375	222	406	228
51	Aero/astronautical engineering	237	108	205	99
52	Chemical engineering	241	99	251	95
53	Civil engineering	271	167	290	160
54	Electrical engineering	341	224	361	224
55	Industrial engineering	239	146	228	142
56	Mechanical engineering	313	186	329	191
57	Other engineering	265	209	279	218
	Unknown major	107	25	72	27

NOTE: Cohort, degree, and major are those reported by institutions at the time of sampling and may not match data reported by the respondents on the survey.

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995

GRADUATE ELIGIBILITY

To be included in the sample, the graduates had to meet all of the following criteria:

- They received a bachelor's or master's degree in an eligible major from the college or university from which they were sampled;
- They received their degree within the two academic years in the study. For the 1995 study, there were two academic years (July 1992 through June 1993, and July 1993 through June 1994);
- They were under the age of 76 and living during the week of April 15, 1995 (the reference week); and
- They lived in the United States during the reference week.

DATA COLLECTION AND RESPONSE

Prior to graduate data collection, it was first necessary to obtain the cooperation of the sampled institutions that provided lists of graduates. The unweighted response rate for the institutional list collection was 97.4 percent. Table 3 shows the list collection response status and rates.

Table 3. Number of sampled institutions by response status and list collection response rate

Total sampled institutions	275
Response status	
Complete list provided	266
Ineligible 1/	2
Nonresponse	7
List collection response rate 2/	
Unweighted	97.4%
Weighted	94.2

1/ The ineligible institutions are those that did not award any eligible degrees within the eligible time period.
2/ The list collection response rate is calculated as: Complete / (Total – Ineligible).

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995

Graduate data collection took place between May 1995 and March 1996, with computer assisted telephone interviewing as the primary means of data collection. Flyers were sent to all graduates announcing the study and asking for the phone numbers at which they could be reached during the survey period. Extensive tracing of graduates was required to obtain the desired response rate. Tracing activities included computerized telephone number searches, national change of address searches (NCOA), school alumni office contacts, school major field department contacts, directory assistance, military locators, post office records, personal referrals from parents or others who knew the graduate, and the use of professional tracing organizations.

Table 4 gives the response rates by cohort, degree, major, type of address, gender, and race/ethnicity. The overall unweighted graduate response rate was 86 percent. The weighted response rate was 83 percent. As can be seen from Table 4, response rates varied somewhat by major field of study and by race/ethnicity. Rates were lowest for those with foreign addresses.

Weight Calculations

To produce national estimates, the data were weighted. The weighting procedures adjusted for unequal selection probabilities, for nonresponse at the institution and graduate levels, and for duplication of graduates on the sampling file (graduates in both cohorts). In addition, a ratio adjustment was made at the institution level using the number of degrees awarded as reported in IPEDS for specified categories of major and degree. The final adjustment to the graduate weights adjusted for responding graduates

Table 4. Number of sampled graduates, unweighted graduate response rates, and weighted graduate response rates, by graduate characteristics

Graduate characteristic	Number of sampled graduates by status				Unweighted graduate response rate 2/	Weighted graduate response rate 2/
	Total	Response		Non-response		
		Complete	Ineligible 1/			
Total	21,000	16,340	1,630	3,030	85.60%	83.20%
Graduation cohort 3/						
1992–93	10,385	7,909	891	1,585	84.7	81.9
1993–94	10,615	8,431	739	14,445	86.4	84.5
Sampled Degree 3/						
Bachelor's	13,893	10,975	934	1,984	85.7	83.5
Master's	7,107	5,365	696	1,046	85.3	82.2
Sampled degree major 3/						
Chemistry	842	687	35	120	85.7	86.2
Physics/astronomy	810	661	80	69	91.5	91.7
Other physical sciences, earth sciences	697	580	62	55	92.1	91.2
Mathematics/statistics	1,005	803	67	135	86.6	85.3
Computer sciences	1,292	895	141	256	80.2	79.8
Environmental/agricultural science	1,010	818	82	110	89.1	87.1
Aero/astronautical engineering	649	548	28	73	88.8	87.7
Chemical engineering	686	573	42	71	89.7	88.8
Civil engineering	888	737	48	103	88.4	88.5
Electrical engineering	1,150	938	60	152	86.8	85.2
Industrial engineering	755	582	63	110	85.4	83.7
Mechanical engineering	1,019	842	46	131	87.1	86.5
Other engineering	971	762	95	114	88.3	85.9
Biological sciences	1,624	1,338	92	194	88.1	86.5
Psychology	2,252	1,752	92	408	81.9	80.1
Economics	1,118	778	141	199	82.2	80.9

See explanatory information and SOURCE at end of table.

Table 4. Number of sampled graduates, unweighted graduate response rates, and weighted graduate response rates, by graduate characteristics

Graduate characteristic	Number of sampled graduates by status				Unweighted graduate response rate 2/	Weighted graduate response rate 2/
	Total	Response		Non-response		
		Complete	Ineligible 1/			
Sampled degree major 3/ (continued)						
Sociology/anthropology	1,263	978	79	206	83.7	82.0
Other social sciences	1,231	890	135	206	83.3	82.3
Political science	1,507	1,117	122	268	82.2	81.5
Not reported	231	61	120	50	78.4	75.4
Type of address provided by school at time of sampling 4/						
U.S. address only	17,823	14,373	1,150	2,300	87.1	85.0
Foreign address	756	316	243	197	73.9	68.4
No address	2,421	1,651	237	533	78.0	76.2
Gender of graduate 5/						
Male	12,805	10,053	975	1,777	86.1	83.9
Female	8,195	6,287	655	1,253	84.7	82.5
Race/ethnicity 3/						
Nonresident alien	555	292	147	116	79.1	72.1
Black, non-Hispanic	1,920	1,418	117	385	79.9	76.0
American Indian/Alaskan native	1,394	1,098	96	200	85.7	80.4
Asian or Pacific islander	1,022	745	105	172	83.2	81.3
Hispanic	1,559	1,144	111	304	80.5	74.2
White, non-Hispanic	8,633	7,222	535	876	89.9	87.3
Not reported	5,917	4,421	519	977	83.5	80.1

1/ The 1,630 ineligibles include the following: graduates living outside of the U.S. during the week of April 15, 1995 (780); graduates who reported an ineligible major field for their sampled degree (469); those who did not receive a bachelor's or master's degree from the sampled school within the correct time frame (307); duplicates (35); deceased (21); those who did not receive a bachelor's or master's degree (12); those who did not attend the sampled school (2); over the age of 75 in April 1995 (1), and other ineligible (3).

2/ The graduate response rate is calculated as (R–I)/[(R–I) + (N * p)] where R = Response (complete plus ineligible), I = Ineligible, N = Nonresponse, p = Proportion of response found inscope calculated as (R–I)/R.

3/ The cohort, degree, major, and race codes are those reported by institutions at the time of sampling and may not match data reported by the respondents on the survey.

4/ This reflects the type of address provided by the institution at the time of sampling. Additional address information may have been provided by the alumni office during data collection. Graduates from whom both a U.S. and a foreign address were provided are included in the foreign address category.

5/ Gender codes were obtained from four sources: those reported by institutions; those reported on the survey; coded from first or middle name; and imputation. Imputation was done on 143 nonrespondents where gender could not be coded from the name.

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995

who could have been sampled twice. For example, a person who obtained an eligible bachelor's degree in 1993 could have obtained an eligible master's degree in 1994 and could have been sampled for either degree. To make the estimates from the survey essentially unbiased, the weights of all responding graduates who could have been sampled twice were divided by 2. The weights of the graduates who were not eligible to be sampled twice were not adjusted.

The weights developed for the NSRCG:95 comprise both full sample weights for use in computing survey estimates and replicate weights for variance estimation using a jackknife replication variance estimation procedure.

Data Editing

Most editing checks were included within the CATI system, including range checks, skip pattern rules, and logical consistency checks. Skip patterns were controlled by the CATI system so that inappropriate items were avoided and appropriate items were not missed. For logical consistency check violations, CATI screens appeared that explained the discrepancy and asked the respondent for corrections. Some additional logical consistency checks were added during data preparation. All of the edit checks discussed above were rerun after item nonresponse imputation.

Imputation of Missing Data

Missing data occurred if the respondent cooperated with the survey but did not answer one or more individual questions. The item nonresponse for this study was very low (typically about 1 percent) due to the use of CATI for data collection and of data retrieval techniques for missing key items. However, imputation for item nonresponse was performed for each survey item to make the study results simpler to present and to allow consistent totals to be obtained when analyzing different questionnaire items. "Not applicable" responses were not imputed since these represented respondents who were not eligible to answer the given item.

Imputation was performed using a hot-deck method. Hot-deck methods estimate the missing value of an item by using values of the same item from other record(s) in the same file. Using the hot-deck procedure, each missing questionnaire item was imputed separately. First, respondent records were sorted by items thought to be related to the missing item. Next, a value was imputed for each item nonresponse recipient from a respondent donor within the same subgroup. The results of the imputation procedure were reviewed to ensure that the plan had been followed correctly. In addition, all edit checks were run on the imputed file to be sure that no data inconsistencies were created by imputation.

Accuracy of Estimates

The survey estimates provided in these tables are subject to two sources of error: sampling and nonsampling errors. Sampling errors occur because the estimates are based on a sample of individuals in the population rather than on the entire population and hence are subject to sampling variability. If the interviews had been conducted with a different sample, the responses would not have been identical; some figures might have been higher, while others might have been lower.

The standard error is the measure of the variability of the estimates due to sampling. It indicates the variability of a sample estimate that would be obtained from all possible samples of a given design and size. Standard errors can be used as a measure of the precision expected from a particular sample. Tables 5 to 8 contain standard errors for key statistics included in the detailed tables.

If all possible samples were surveyed under similar conditions, intervals within plus or minus 1.96 standard errors of a particular statistic would include the true population parameter being estimated in about 95 percent of the samples. This is the 95 percent confidence interval. For example, suppose the total number of 1993 bachelor's degree recipients majoring in engineering is 58,400 and the estimated standard error is 2,700. The 95 percent confidence interval for the statistic extends from:

$$58{,}400 - (2{,}700 \times 1.96) \text{ to } 58{,}400 + (2{,}700 \times 1.96) = 53{,}108 \text{ to } 63{,}692$$

Table 5. Unweighted number, weighted estimate, and standard errors for 1993 science and engineering bachelor's degree recipients, by graduate characteristics: April 1995

Characteristic	Unweighted number	Weighted estimate			
		Weighted number	Standard error	Weighted percent	Standard error
Total 1993 science and engineering bachelor's degree recipients	5,549	348,900	9,400	100	
Sex					
Male	3,340	186,300	5,200	53	1.00
Female	2,209	162,600	6,400	47	1.00
Race/ethnicity					
American Indian/Alaskan Native	329	1,800	200	1	0.07
Asian/Pacific Islander	356	26,500	1,800	8	0.50
Black, non-Hispanic	550	19,800	2,000	6	0.61
Hispanic	511	18,200	1,400	5	0.42
White, non-Hispanic	3,803	282,600	9,500	81	0.90
Type of major field					
Science	3,896	290,500	10,100	83	0.93
Engineering	1,653	58,400	2,700	17	0.93
Major field of study					
Computer and mathematical sciences	549	35,200	1,900	10	0.45
Life and related sciences	721	58,600	2,900	17	0.62
Physical and related sciences	589	16,500	900	5	0.23
Social and related sciences	2,037	180,200	6,900	52	0.96
Engineering	1,653	58,400	2,700	17	0.93
Occupation (total employed)	4,778	293,100	7,800	100	
Computer and mathematical sciences	392	22,500	1,300	8	0.46
Life and related sciences	127	9,500	1,000	3	0.33
Physical scientists	252	8,600	800	3	0.25
Social and related scientists	121	9,700	1,200	3	0.38
Engineers	1,065	37,600	2,000	13	0.78
Other occupations	2,821	205,200	7,400	70	1.10

NOTE: Represents graduates from July 1992 through June 1993. Details may not add to totals due to rounding.

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995

Table 6. Unweighted number, weighted estimate, and standard errors for 1993 science and engineering master's degree recipients, by graduate characteristics: April 1995

Characteristic	Unweighted number	Weighted estimate			
		Weighted number	Standard error	Weighted percent	Standard error
Total 1993 science and engineering master's degree recipients	2,711	73,200	2,600	100	
Sex					
Male	1,740	45,400	1,700	62	1.24
Female	971	27,800	1,400	38	1.24
Race/ethnicity					
American Indian/Alaskan Native	55	400	100	1	0.13
Asian/Pacific Islander	460	14,500	900	20	0.98
Black, non-Hispanic	204	3,200	500	4	0.65
Hispanic	199	3,300	300	5	0.44
White, non-Hispanic	1,793	51,800	1,900	71	1.14
Type of major field					
Science	1,822	50,200	2,400	69	1.53
Engineering	889	23,000	1,100	31	1.53
Major field of study					
Computer and mathematical sciences	324	12,800	1,100	18	1.21
Life and related sciences	329	7,600	1,300	10	1.66
Physical and related sciences	379	4,800	300	7	0.43
Social and related sciences	790	25,000	1,400	34	1.45
Engineering	889	23,000	1,100	31	1.53
Occupation (total employed)	2,393	64,700	2,300	100	
Computer and mathematical sciences	321	11,500	800	18	0.96
Life and related sciences	140	3,100	300	5	0.51
Physical scientists	269	4,000	300	6	0.52
Social and related scientists	239	7,800	500	12	0.80
Engineers	643	15,900	800	25	1.10
Other occupations	781	22,300	1,400	34	1.50

NOTE: Represents graduates from July 1992 through June 1993. Details may not add to totals due to rounding.

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995

Table 7. Unweighted number, weighted estimate, and standard errors for 1994 science and engineering bachelor's degree recipients, by graduate characteristics: April 1995

Characteristic	Unweighted number	Weighted estimate			
		Weighted number	Standard error	Weighted percent	Standard error
Total 1994 science and engineering bachelor's degree recipients	5,578	349,700	9,400	100	
Sex					
Male	3,369	188,700	5,500	54	1.06
Female	2,209	161,000	6,400	46	1.06
Race/ethnicity					
American Indian/Alaskan Native	313	1,600	300	*	0.09
Asian/Pacific Islander	405	30,100	1,600	9	0.46
Black, non-Hispanic	577	21,700	1,900	6	0.58
Hispanic	579	21,400	1,600	6	0.45
White, non-Hispanic	3,704	274,900	9,400	79	0.96
Type of major field					
Science	3,919	289,700	9,900	83	0.96
Engineering	1,659	60,000	2,900	17	0.96
Major field of study					
Computer and mathematical sciences	552	34,000	1,800	10	0.45
Life and related sciences	780	62,500	3,200	18	0.69
Physical and related sciences	583	16,700	1,000	5	0.24
Social and related sciences	2,004	176,500	6,700	50	0.97
Engineering	1,659	60,000	2,900	17	0.96
Occupation (total employed)	4,713	291,500	8,300	100	
Computer and mathematical sciences	354	19,400	1,300	7	0.46
Life and related sciences	143	9,900	1,100	3	0.35
Physical scientists	232	8,200	700	3	0.21
Social and related scientists	109	10,000	1,300	3	0.43
Engineers	1,026	38,500	1,900	13	0.74
Other occupations	2,849	205,600	7,100	71	0.83

* = Less than 0.5.

NOTE: Represents graduates from July 1993 through June 1994. Details may not add to totals due to rounding.

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995

Table 8. Unweighted number, weighted estimate, and standard errors for 1994 science and engineering master's degree recipients, by graduate characteristics: April 1995

Characteristic	Unweighted number	Weighted estimate			
		Weighted number	Standard error	Weighted percent	Standard error
Total 1994 science and engineering master's degree recipients	2,721	73,400	2,500	100	
Sex					
Male	1,759	45,700	1,700	62	1.14
Female	962	27,800	1,300	38	1.14
Race/ethnicity					
American Indian/Alaskan Native	50	300	100	*	0.14
Asian/Pacific Islander	505	15,700	900	21	0.98
Black, non-Hispanic	212	3,100	400	4	0.44
Hispanic	204	2,800	200	4	0.33
White, non-Hispanic	1,750	51,500	1,800	70	1.01
Type of major field					
Science	1,842	49,800	2,300	68	1.38
Engineering	879	23,600	1,000	32	1.38
Major field of study					
Computer and mathematical sciences	326	11,500	700	16	0.90
Life and related sciences	327	7,400	1,000	10	1.28
Physical and related sciences	389	4,900	300	7	0.38
Social and related sciences	800	26,000	1,600	35	1.52
Engineering	879	23,600	1,000	32	1.38
Occupation (total employed)	2,362	63,900	2,100	100	
Computer and mathematical sciences	301	10,500	700	16	0.90
Life and related sciences	121	2,900	300	4	0.41
Physical scientists	259	3,600	300	6	0.43
Social and related scientists	239	8,300	700	13	0.95
Engineers	622	15,900	900	25	1.32
Other occupations	820	22,800	1,100	36	1.20

* = Less than 0.5.

NOTE: Represents graduates from July 1993 through June 1994. Details may not add to totals due to rounding.

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995

This means that one can be confident that intervals constructed in this way contain the true population parameter for 95 percent of all possible samples.

Estimates of standard errors were computed using a technique known as jackknife replication. As with any replication method, jackknife replication involves constructing a number of subsamples (replicates) from the full sample and computing the statistics of interest for each replicate. The mean square error of the replicate estimates around their corresponding full sample estimate provides an estimate of the sampling variance of the statistic of interest. To construct the replicates, 86 stratified subsamples of the full sample were created. Eighty-six jackknife replicates were then formed by deleting one subsample at a time from the full sample. WesVarPC, a public use computer program developed at Westat, was used to calculate direct estimates of standard errors for a number of statistics from the survey.

Generalized Variance Functions

Computing and printing standard errors for each estimate from the survey is a time-consuming and costly effort. For this survey, a different approach was taken for estimating the standard errors of the estimates included in this report. First, the standard errors for a large number of different estimates were directly computed using the jackknife replication procedures described above. Next, models were fitted to the estimates and standard errors and the parameters of these models were estimated from the direct estimates. These models and their estimated parameters were used to approximate the standard error of an estimate from the survey. This process is called the development of generalized variance functions.

Models were fitted for the two types of estimates of primary interest: estimated totals and estimated percentages. It should be noted that the models used to estimate the generalized variance functions may not be completely appropriate for all estimates.

Sampling Errors for Totals

For estimated totals, the generalized variance function applied assumes that the relative variance of the estimate (the square of the standard error divided by the square of the estimate) is a linear function of the inverse of the estimate. Using this model, the standard error of an estimate can be computed as:

$$se(y) = \sqrt{ay^2 + by} \qquad (1)$$

where $se(y)$ is the standard error of the estimate y, and a and b are estimated parameters of the model. The parameters of the models were computed separately for 1993 bachelor's and master's recipients and for 1994 bachelor's and master's recipients, as well as for other important domains of interest. The estimates of the parameters are given in Table 9.

The following steps should be followed to approximate the standard error of an estimated total:

1) obtain the estimated total from the survey,

2) determine the most appropriate domain for the estimate from Table 9,

3) refer to Table 9 to get the estimates of a and b for this domain, and

4) compute the generalized variance using equation (1) above.

For example, suppose that the number of 1993 bachelor's degree recipients in engineering who were currently working in a engineering-related job was 40,000 (y = 40,000). The most appropriate domain from Table 9 is engineering majors with bachelor's degrees from 1993 and the parameters are a = 0.006357 and b = 19.377. Approximate the standard error using equation (1) as:

$$\begin{aligned} se(40{,}000) &= \sqrt{.006357(40{,}000)^2 + 19.377(40{,}000)} \\ &= 3{,}309 \end{aligned}$$

Sampling Errors for Percentages

The model used to approximate the standard errors for estimates of percentages was somewhat less complex. The generalized variance for estimated percentages assumed that the ratio of the variance of an estimate to the variance of the same estimate from a

Table 9. Estimated parameters for computing generalized variances for estimates from the NSRCG:95

Domain	Bachelor's recipients parameter estimates			Master's recipients parameter estimates		
	a	*b*	*DEFF**	*a*	*b*	*DEFF**
1993 graduates						
All graduates	0.007695	21.661	1.9	0.007682	17.111	1.6
Sex						
Male	0.000037	108.600	1.8	0.001648	36.908	1.7
Female	0.001615	78.105	2.2	0.002994	26.467	1.7
Major						
Science majors	0.001625	59.031	2.3	0.002302	37.582	2.1
Engineering majors	0.006357	19.377	1.8	0.001178	35.455	1.8
Occupation						
Scientists	0.000782	86.156	1.7	0.000775	40.336	1.7
Engineers	–0.000410	81.531	1.8	0.002812	21.540	1.4
Other occupations	0.001656	54.644	2.3	0.004259	27.151	1.9
Race/ethnicity						
White, non-Hispanic	0.000903	100.226	2.2	0.00155	35.905	1.9
Black, non-Hispanic	0.012871	23.608	2.2	0.03729	10.130	1.7
Hispanic	0.002875	63.179	1.5	0.012692	16.748	1.1
Asian/Pacific Islanders	-0.005320	139.512	2.0	0.002848	36.229	1.6
American Indian/Alask Nat	-0.002710	24.338	0.4	**	**	1.0
1994 graduates						
All graduates	0.005197	36.643	1.7	0.006248	15.649	1.5
Sex						
Male	–0.000390	127.704	1.9	0.000715	46.800	1.7
Female	0.001733	76.624	2.2	0.002574	25.781	1.6
Major						
Science majors	0.001402	73.153	2.1	0.001913	36.324	1.9
Engineering majors	0.005601	31.693	2.0	0.006826	16.731	1.8
Occupation						
Scientists	0.001379	85.395	1.6	0.001551	36.276	1.7
Engineers	–0.001320	89.808	1.6	0.003521	28.574	1.8
Other occupations	0.001506	54.044	1.9	0.00261	24.271	1.5
Race/ethnicity						
White, non-Hispanic	0.000873	104.618	2.3	0.001459	30.064	1.7
Black, non-Hispanic	0.008010	44.028	1.9	0.026034	8.2690	1.2
Hispanic	0.003739	51.617	1.5	0.009851	14.013	0.8
Asian/Pacific Islanders	0.001166	85.471	1.6	0.004934	25.061	1.6
American Indian/Alask Nat	**	**	1.0	**	**	1.1

*DEFF = Design effect.

**These estimates are not reported because the specified model resulted in R-square values too small to report.

SOURCE: National Science Foundation, National Survey of Recent College Graduates, 1995

simple random sample of the same size was a constant. This ratio is called the design effect and is often labeled the DEFF. Since the variance for an estimated percentage, p, from a simple random sample is $p(100 - p)$ divided by the sample size, the standard error of an estimated percentage can be written as:

$$se(p) = \sqrt{DEFF(p)(100 - p)/n} \qquad (2)$$

where n is the sample size or denominator of the estimated percentage. DEFF's were computed separately for 1993 bachelor's and master's recipients and for 1994 bachelor's and master's recipients, as well as for other important domains of interest. The median or average value of the DEFF's from these computations are given in Table 9.

The following steps should be followed to approximate the standard error of an estimated percentage:

1) obtain the estimated percentage and sample size from the survey,

2) determine the most appropriate domain for the estimate from Table 9,

3) refer to Table 9 to get the estimates of the DEFF for this domain, and

4) compute the generalized variance using equation (2) above.

For example, suppose that the percentage of 1993 bachelor's degree recipients in engineering who were currently working in a engineering-related job was 60 percent ($p = 60$) and the number of engineering majors from the survey (sample size, n) was 1,653. The most appropriate domain from Table 9 is engineering majors with bachelor's degrees from 1993 and the DEFF for this domain is 1.8. Approximate the standard error using equation (2) as:

$$se(60\%) = \sqrt{1.8(60)(100 - 60)/1{,}653} = 2.6\%$$

Nonsampling Errors

In addition to sampling errors, the survey estimates are subject to nonsampling errors that can arise because of nonobservation (nonresponse or noncoverage), reporting errors, and errors made in the collection and processing of the data. These errors can sometimes bias the data. The NSRCG:95 included procedures for both minimizing and measuring nonsampling errors.

Procedures to minimize nonsampling errors were followed throughout the survey. Extensive questionnaire design work was done by Mathematica Policy Research (MPR), NSF, and Westat. This work included focus groups, expert panel reviews, and mail and CATI pretests. This design work was done in conjunction with the other two SESTAT surveys.

Comprehensive training and monitoring of interviewers and data processing staff was conducted to help ensure the consistency and accuracy of the data file. Data collection was done almost entirely by telephone to help reduce the amount of item nonresponse and item inconsistency. Mail questionnaires were used for cases difficult to complete by telephone. Nonresponse was handled in ways designed to minimize the impact on data quality (through weighting adjustments and imputation). In data preparation, a special effort was made in the area of occupational coding. All respondent-chosen codes were verified by data preparation staff using a variety of information collected on the survey and applying coding rules developed by NSF for the SESTAT system.

While general sampling theory can be used to estimate the sampling variability of a statistic, the measurement of nonsampling error is not easy and usually requires an experiment be conducted as part of the data collection, or that data external to the study be used. On the NSRCG:95, two quality analysis studies were conducted: (1) an analysis of occupational coding; and (2) a CATI reinterview.

The occupational coding report included an analysis of the CATI autocoding of occupation and the best coding operation. During CATI interviewing, each respondent's verbatim occupation description was autocoded by computer into a standard SESTAT code whenever possible. Autocoding included both coding directly to a final category and coding to an intermediate code-selection screen. If the description could not be autocoded, the respondent was asked to select the appropriate occupation category during the interview. For the primary occupation, 22 percent of the responses were autocoded to a final category and 19 percent were autocoded to an intermediate screen. The results and timings of the occupation autocoding were

examined and the process was found to be successful and efficient.

For the best coding operation, an occupational worksheet for each respondent was generated and reviewed by an experienced occupational coder. This review was based on the work-related information provided by the graduate. If the respondent's self-selected occupation code was inappropriate, a new or "best" code was assigned. A total of 17,894 responses were received to the three occupation questions. Of these, 25 percent received updated codes during the best coding process, with 16 percent being recoded from the "other" category and 9 percent recoded from the "non-other" categories. This analysis indicated that the best coding activity was necessary to ensure that the most appropriate occupation codes were included on the final data file.

The second quality analysis study involved a reinterview of a sample of 800 respondents. For this study, sampled respondents were interviewed a second time and responses to the two interviews were compared. This analysis found that the questionnaire items in which respondents were asked to provide reasons for certain events or behaviors had relatively large index of inconsistency values. Examples include reasons for not working during the reference week and reasons for working part-time. High response variability is typical for items that ask about reasons and beliefs rather than behaviors, and the results were not unusual for these types of items. Some of the other differences between the two interviews were attributed to the time lag between the original interview and reinterview. Overall, the results of the reinterview study did not point to any significant problems with the questionnaire.

Since the 1995 and 1993 NSRCG cycles used a very similar questionnaire and survey methodology, the results of the quality studies conducted during the 1993 cycle can also be used as an indication of data quality for the 1995 study. For the NSRCG:93, two data quality studies were completed: (1) an analysis of interviewer variance, and (2) a behavioral coding analysis of 100 recorded interviews. The interviewer variance study was designed to measure how interviewer effects might have impacted on the precision of the estimates. The results showed that interviewer effects for most items was minimal and thus had a very limited effect on the standard error of the estimates. Interviewer variance was highest for open-ended questions.

The behavioral coding study was done to observe the extent to which interviewers were following the structured interview and the extent to which it became necessary for them to give unstructured additional explanation or comment to respondents. As part of the study, 100 interviews were taped and then coded on a variety of behavioral dimensions. This analysis revealed that, on the whole, the interview proceeded in a very structured manner with 85 percent of all question and answer "dyads" being "asked and answered only." Additional unstructured interaction/discussion took place most frequently for those questions in which there was some ambiguity in the topic. In most cases this interaction was judged to have facilitated obtaining the correct response.

For both survey cycles, results from the quality studies were used to identify those questionnaire items that might need additional revision for the next study cycle. Debriefing sessions concerning the survey were held with interviewers, and this information was also used in revising the survey for the next cycle.

Comparisons of Data With Previous Years' Results

A word of caution needs to be given concerning comparisons with previous NSRCG results. During the 1993 cycle, the SESTAT system underwent considerable revision in several areas, including survey eligibility, data collection procedures, questionnaire content and wording, and data coding and editing procedures. For a detailed discussion of these changes, please see the 1993 Report on *Characteristics of Recent Science and Engineering Graduates, Technical Notes.*

The changes made for the 1995 cycle were less significant. Among the important changes from the 1993 cycle to the 1995 cycle that may impact comparisons with previous years' survey results are the following:

- **Changes in the major fields represented.** Certain majors excluded in the 1993 cycle were included in the NSRCG:95 cycle. These majors were: educational psychology; clinical psychology; counseling psychology; school psychology; archeology; criminology; and area

and ethnic studies. The appendix presents a listing of eligible and ineligible majors for the 1995 cycle with a cross-reference to the Department of Education's standard Classification of Instructional Programs (CIP) code.

- **Changes in the salary question.** In the NSRCG:93, the respondent was given the choice to answer in hours, weeks, months, years, or academic years. In the NSRCG:95, the respondent first was asked to give an annual salary, and if he/she was unable to do so, the interviewer prompted the respondent for an amount per hour, week, month, year, or academic year. Annual income was then calculated for all respondents.

- **Changes in the hours and weeks worked questions.** In the NSRCG:93, the graduate was asked if the salary reported was based on working full time. In the NSRCG:95, two questions were asked. The first, B29, asked how many hours the respondent worked during a typical week. The second, B29PAID, asked for how many hours during a typical week the respondent was paid. In addition, the respondent was asked in B29WEEKS whether their salary was based on a full year (52 weeks) or fewer than 52. If fewer, the interviewer then asked on how many weeks per year the respondent's salary was based (B29A).

- **New NSF Guidelines for occupational coding.** During data collection, several changes in occupational coding were incorporated into the best coding process. For the NSRCG:93, first line supervisors and managers in sales and marketing occupations were classified in the same category as the workers they supervised. Following new NSF guidelines, in the NSRCG:95 they were coded as 203, other marketing and sales occupations. Recreational workers were coded as social workers (240) and athletes as artists, etc. (010) in the 1993 cycle, but both were classified as other occupations (500) in the 1995 cycle.

Comparisons With IPEDS Data

The National Center for Education Statistics (NCES) conducts a survey of the nation's postsecondary institutions, called IPEDS. The IPEDS Completions Survey reports on the number of degrees awarded by all major fields of study, along with estimates by gender and race/ethnicity.

Although both the NSRCG and IPEDS are surveys of postsecondary education and both report on completions from those institutions, there are important differences in the target populations for the two surveys that directly affect the estimates of the number of graduates. The reason for the different target populations is that the goals of the surveys are not the same. The IPEDS estimates of degrees awarded are intended to measure the output of the educational system. The NSRCG estimates are intended to measure the supply and utilization of a portion of graduates in the years following their completion of a degree. These goals result in definitions of the target population that are not completely consistent for the two surveys. Other differences between the estimates can be explained to a very large extent by a few important aspects of the design or reporting procedures in the two surveys. The main differences between the two studies that affect comparisons of estimates overall and by race/ethnicity are listed below.

- The IPEDS Completions data file represents a count of degrees awarded, whereas the NSRCG represents graduates (persons). If a person receives more than one degree, institutions are instructed to report each degree separately in IPEDS. In the NSRCG, each person is counted only once.

- The NSRCG includes people who were residing in the United States during the reference week for the survey (the week of April 15 of the survey year). People who received degrees during the years covered by the survey, but resided outside the U.S. during the reference week appear in IPEDS counts, but not in NSRCG counts.

- The NSRCG includes only major fields of study that meet the specific SESTAT system definition of science and engineering (S&E),

while IPEDS includes all fields. The SESTAT field codes were designed to map directly to the 6-digit Classification of Instructional Program (CIP) codes used in IPEDS. However, published reports from the two studies may group the specific field codes differently for reporting purposes. Therefore, when comparing the NSRCG estimates in this report to IPEDS, care must be taken to select and group the IPEDS estimates according to the NSRCG field definitions shown in the appendix. For example, the NSRCG reporting category of Computer and Information Sciences does not include computer programming or data processing technology, but these fields are included in this category in NCES's *Digest of Education Statistics*. In addition, several NSRCG reporting categories include fields classified as multi/interdisciplinary studies in IPEDS. The NSRCG reporting category of Social and Related Sciences has the most differences in definition from IPEDS.

- The IPEDS data reflect information submitted by institutions from administrative records, whereas the NSRCG represents reports of individual graduates collected in interviews. Often, estimates differ when the mode of data collection and sources of data are different.

- Whereas the IPEDS is a census of postsecondary institutions, the NSRCG is a sample survey. As a result, NSRCG estimates include the sampling error that is a feature of all sample surveys.

- There is an additional consideration for estimates by race/ethnicity. Prior to the 1994–95 academic year, IPEDS collected race/ethnicity data only by broad 2-digit CIP code fields, not by the specific 6-digit CIP fields needed to identify the S&E fields as defined on NSRCG. Thus, it is not possible to obtain IPEDS race/ethnicity data that precisely match the S&E population as defined by NSRCG for the academic years included in this report. For example, the 2-digit CIP for Social Sciences and History includes history, which is not an S&E field, and does not include fields such as agricultural economics and public policy analysis that are S&E.

Despite these factors, the NSRCG and IPEDS estimates are consistent when appropriate adjustments for these differences are made. For example, the proportional distributions of graduates by field of study are nearly identical, and the numerical estimates are similar. Further information on the comparison of NSRCG and IPEDS estimates is available in the report, *A Comparison of Estimates in the NSRCG and IPEDS*, available in the SRS website at http://www.nsf.gov/sbe/srs/stats.htm.

Other Explanatory Information

The following definitions are provided to facilitate the reader's use of the data in this report.

Coverage of tables: The tables in this report present information for four groups of recent graduates. These four groups consist of the two degree levels of bachelor's and master's, and the two academic years of 1992–93 and 1993–94.

Major field of study: Derived from the survey major field category most closely related to the respondent's degree field. Exhibit 1 gives a listing of the detailed major field codes used in the survey. Exhibit 2 gives a listing of the summary major field codes developed by NSF and used in the tables. The appendix lists the eligible and ineligible major fields within each summary category.

Occupation: Derived from the survey job list category most closely related to the respondent's primary job. Exhibit 3 gives a listing of the detailed job codes used in the survey and Exhibit 4 gives the summary occupation codes developed by NSF and used in the tables.

Labor force: The labor force includes individuals working full or part time as well as those not working but seeking work or on layoff. It is a sum of the employed and the unemployed.

Unemployed: The unemployed are those who were not working on April 15 and were seeking work or on layoff from a job.

Type of employer: This is the sector of employment in which the respondent was working on his or her primary job held on April 15, 1995. In this categorization, those working in 4-year colleges and

universities or university-affiliated medical schools or research organizations were classified as employed in the "4-year college and university" sector. Those working in elementary, middle, secondary, or 2-year colleges or other educational institutions were categorized in the group "other educational." The other sectors are private, for profit, self-employed, nonprofit organizations, Federal Government, and state or local government. Those reporting that they were self-employed but in an incorporated business were classified in the private, for-profit sector.

Primary work activity: This refers to the activity that occupied the most time on the respondent's job. In reporting the data, those who reported applied research, basic research, development, or design work were grouped together in "research and development (R&D)." Those who reported teaching were given the code "teaching." Those who reported accounting, finance or contracts, employee relations, quality or productivity management, sales and marketing, or managing and supervising were grouped into "management, sales, administration." Those who reported computer applications were placed in "computer applications." Those who reported production, operations, maintenance, professional services or other activities were given the code "other."

Full-time salary: This is the annual income for the full-time employed who were not self-employed (either incorporated or not incorporated), whose principal job was not less than 35 hours per week, and who were not full-time students on the reference date (April 15, 1995). To annualize salary, reported hourly salaries were multiplied by the reported number of hours paid per week, then multiplied by 52; reported weekly salaries were multiplied by 52; reported monthly salaries were multiplied by 12. Yearly and academic yearly salaries were left as reported.

Exhibit 1. List A: Education codes

This EDUCATION CODES list is ordered alphabetically. The titles in bold type are broad fields of study. To make sure you have found the BEST code, please review ALL broad categories before making your choice. If you cannot find the code that BEST describes your field of study, use the "OTHER" code under the most appropriate broad field in bold print. If none of the codes fit your field of study, use Code 995.

Agriculture Business and Production
601 Agriculture, economics (also see 655 and 923)
602 OTHER agricultural business and production

Agricultural Sciences
605 Animal sciences
606 Food sciences and technology (also see 638)
607 Plant sciences (also see 633)
608 OTHER agricultural sciences

610 **Architecture/Environmental Design** (for architectural engineering, see 723)

620 **Area/Ethnic Studies**

Biological/Life Sciences
631 Biochemistry and biophysics
632 Biology, general
633 Botany (also see 607)
634 Cell and molecular biology
635 Ecology
636 Genetics, animal and plant
637 Microbiology
638 Nutritional sciences (also see 606)
639 Pharmacology, human and animal (also see 788)
640 Physiology, human and animal
641 Zoology, general
642 OTHER biological sciences

Business Management/Administrative Services
651 Accounting
652 Actuarial science
653 Business administration and management
654 Business, general
655 Business/managerial economics (also see 601 and 923)
656 Business marketing/marketing mgmt.
657 Financial management
658 Marketing research
843 Operations research
659 OTHER business management/admin. services

Communications
661 Communications, general
662 Journalism
663 OTHER communications

Computer and Information Sciences
671 Computer/information sciences, general
672 Computer programming
673 Computer science (also see 727)
674 Computer systems analysis
675 Data processing technology
676 Information services and systems
677 OTHER computer and information sciences

Conservation/Renewable Natural Resources
680 Environmental science studies
681 Forestry sciences
682 OTHER conservation/renewable natural resources

690 **Criminal Justice/Protective Services** (also see 922)

Education
701 Administration
702 Computer teacher education
703 Counselor education/guidance services
704 Educational psychology
705 Elementary teacher education
706 Mathematics teacher education
707 Physical education/coaching
708 Pre-elementary teacher education
709 Science teacher education
710 Secondary teacher education
711 Special education
712 Social science teacher education
713 OTHER education

Engineering

721 Aerospace, aeronautical, astronautical engineering
722 Agricultural engineering
723 Architectural engineering
724 Bioengineering and biomedical engineering
725 Chemical engineering
726 Civil engineering
727 Computer/systems engineering (also see 673)
728 Electrical, electronics, communications engineering (also see 751)
729 Engineering sciences, mechanics, physics
730 Environmental engineering
731 General engineering
732 Geophysical engineering
733 Industrial engineering (also see 752)
734 Materials engineering, including ceramics and textiles
735 Mechanical engineering (also see 753)
736 Metallurgical engineering
737 Mining and minerals engineering
738 Naval architecture and marine engineering
739 Nuclear engineering
740 Petroleum engineering
741 OTHER engineering

Engineering-Related Technologies

751 Electrical and electronic technologies
752 Industrial production technologies
753 Mechanical engineering-related technologies
754 OTHER engineering-related technologies

Languages, Linguistics, Literature/Letters

760 English Language and Literature/Letters
771 Linguistics
772 OTHER foreign languages and literature

Health Professions and Related Sciences

781 Audiology and speech pathology
782 Health services administration
783 Health/medical assistants
784 Health/medical technologies
785 Medical preparatory programs (e.g., pre-dentistry, pre-medical, pre-veterinary)
786 Medicine (e.g., dentistry, optometry, osteopathic, podiatry, veterinary)
787 Nursing (4 years or longer program)
788 Pharmacy (also see 639)
789 Physical therapy and other rehabilitation/ therapeutic services
790 Public health (including environmental health and epidemiology)
791 OTHER health/medical sciences

800 **Home Economics**

810 **Law/Prelaw/Legal Studies**

820 **Liberal Arts/General Studies**

830 **Library Science**

Mathematics

841 Applied (also see 843, 652)
842 Mathematics, general
843 Operations research
844 Statistics
845 OTHER mathematics

850 **Parks, Recreation, Leisure, and Fitness Studies**

Philosophy, Religion, and Theology

861 Philosophy of science
862 OTHER philosophy, religion, theology

Physical Sciences

871 Astronomy and astrophysics
872 Atmospheric sciences and meteorology
631 Biochemistry and biophysics
873 Chemistry
874 Earth sciences
680 Environmental science studies
875 Geology
876 Geological sciences, other
877 Oceanography
878 Physics
879 OTHER physical sciences

Psychology

891 Clinical
892 Counseling
704 Educational
893 Experimental
894 General
895 Industrial/Organizational
896 Social
897 OTHER psychology

Public Affairs

901 Public administration
902 Public policy studies
903 OTHER public affairs

910 **Social Work**

Social Sciences and History

921 Anthropology and archeology
922 Criminology (also see 690)
923 Economics (also see 601 and 655)
924 Geography
925 History of science
926 History, other
927 International relations
928 Political science and government
929 Sociology
930 OTHER social sciences

Visual and Performing Arts

941 Dramatic arts
942 Fine arts, all fields
943 Music, all fields
944 OTHER visual and performing arts

991 **Other science/engineering**
995 **Other Fields—Not Listed**

Exhibit 2. Major code categories for tabulation

1. Computer and mathematical sciences

11 Computer science and information sciences 671, 673, 674, 676, 677
12 Mathematics and related sciences 841–845

2. Life and related sciences

21 Agricultural and food sciences 605–608
22 Biological sciences 631–642, 991, (781–791 Ph.D. degree only)
23 Environmental life sciences, including forestry sciences 680, 681

3. Physical and related sciences

31 Chemistry, except biochemistry 873
32 Earth sciences, geology, and oceanography 872, 874–877
33 Physics and astronomy 871, 878
34 Other physical sciences 879

4. Social and related sciences

41 Economics 601, 923
42 Political science and related sciences 902, 927, 928
43 Psychology 891–897, 704
44 Sociology and anthropology 921, 922, 929
45 Other social sciences 771, 861, 924, 925, 930, 620

5. Engineering

51 Aerospace and related engineering 721
52 Chemical engineering 725
53 Civil and architectural engineering 726, 723
54 Electrical, electronic, computer, and communications engineering 727, 728
55 Industrial engineering 733
56 Mechanical engineering 735
57 Other engineering 722, 724, 729–732, 734, 736–741

6. 60 Other majors

602, 610, 651–659, 661–663, 672, 675, 682, 690, 701–703, 705–713, 751–754, 760, 772, 781–791,* 800, 810, 820, 830, 850, 862, 901, 903, 910, 926, 941–944, 995

*At the BA, MA, or professional level.

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995

Exhibit 3. List B: Job codes

This JOBS CODES list is ordered alphabetically. The titles in bold type are broad job categories. To make sure you have found the BEST code, please review ALL broad categories before making your choice. If you cannot find the code that BEST describes your job, use the "OTHER" code under the most appropriate broad category in bold print. If none of the codes fit your field of study, use Code 500.

010 **Artists, Broadcasters, Editors, Entertainers, Public Relations Specialists, Writers**

Biological/Life Scientists
021 Agricultural and food scientists
022 Biochemists and biophysicists
023 Biological scientists (e.g., botanists, ecologists, zoologists)
024 Forestry, conservation scientists
025 Medical scientists (excluding practitioners)
026 Technologists & technicians in the biological/life sciences
027 OTHER biological/life scientists

Clerical/Administrative Support
031 Accounting clerks, bookkeepers
032 Secretaries, receptionists, typists
033 OTHER administrative (e.g., record clerks, telephone operators)

040 **Clergy & Other Religious Workers**

Computer Occupations (Also see 173)
*** Computer engineers (See 087, 088 under Engineering)
051 Computer programmers (business, scientific, process control)
052 Computer system analysts
053 Computer scientists, except system analysts
054 Information systems scientists or analysts
055 OTHER computer, information science occupations

*** **Consultants** (select the code that comes closest to your usual area of consulting)

070 **Counselors, Educational & Vocational** (Also see 236)

Engineers, Architects, Surveyors
081 Architects
*** Engineers (Also see 100–103)
082 Aeronautical, aerospace, astronautical
083 Agricultural
084 Bioengineering & biomedical
085 Chemical
086 Civil, including architectural & sanitary
087 Computer engineer—hardware
088 Computer engineer—software
089 Electrical, electronic
090 Environmental
091 Industrial
092 Marine engineer or naval architect
093 Materials or metallurgical
094 Mechanical
095 Mining or geological
096 Nuclear
097 Petroleum
098 Sales
099 Other engineers

*** Engineering Technologists and Technicians
100 Electrical, electronic, industrial, mechanical
101 Drafting occupations, including computer drafting
102 Surveying and mapping
103 OTHER engineering technologists and technicians
104 Surveyors

110 **Farmers, Foresters & Fishermen**

Exhibit 3. List B: Job codes

Health Occupations

111 Diagnosing/Treating Practitioners (e.g., dentists, optometrists, physicians, psychiatrists, podia trists, surgeons, veterinarians)
112 Registered nurses, pharmacists, dieticians, therapists, physician assistants
113 Health Technologists & Technicians (e.g., dental hygienists, health record technologist/techni cians, licensed practical nurses, medical or laboratory technicians, radiologic technolo gists/technicians)
114 OTHER health occupations

120 **Lawyers, Judges**

130 **Librarians, Archivists, Curators**

Managers, Executives, Administrators (Also see 151–153)

141 Top and mid-level managers, executives, administrators (people who manage other managers)
*** All other managers, including the self-em ployed—*Use the code that comes closest to the field you manage*

Management-Related Occupations (Also see 141)

151 Accountants, auditors, and other financial specialists
152 Personnel, training, and labor relations specialists
153 OTHER management related occupations

Mathematical Scientists

171 Actuaries
172 Mathematicians
173 Operations research analysts, modelling
174 Statisticians
175 Technologists and technicians in the mathemati-cal sciences
176 OTHER mathematical scientists

Physical Scientists

191 Astronomers
192 Atmospheric and space scientists
193 Chemists, except biochemists
194 Geologists, including earth scientists
195 Oceanographers
196 Physicists
197 Technologists and technicians in the physical sciences
198 OTHER physical scientists

*** **Research Associates/Assistants** (Select the code that comes closest to your field)

Sales and Marketing

200 Insurance, securities, real estate, & business services
201 Sales Occupations—Commodities Except Retail (e.g., industrial machinery/equipment/ supplies, medical and dental equip/supplies)
202 Sales Occupations—Retail (e.g., furnishings, clothing, motor vehicles, cosmetics)
203 OTHER marketing and sales occupations

Service Occupations, Except Health (Also see 111–114)

221 Food Preparation and Service (e.g., cooks, waitresses, bartenders)
222 Protective services (e.g., fire fighters, police, guards)
223 OTHER service occupations, except health

Social Scientists

231 Anthropologists
232 Economists
233 Historians, science and technology
234 Historians, except science and technology
235 Political scientists
236 Psychologists, including clinical (Also see 070)
237 Sociologists
238 OTHER social scientists

Exhibit 3. List B: Job codes

240 **Social Workers**

Teachers/Professors

251 Pre-Kindergarten and kindergarten
252 Elementary
253 Secondary—computer, math, or sciences
254 Secondary—social sciences
255 Secondary—other subjects
256 Special education—primary and secondary
257 OTHER precollegiate area
*** Postsecondary
- 271 Agriculture
- 272 Art, Drama, and Music
- 273 Biological Sciences
- 274 Business Commerce and Marketing
- 275 Chemistry
- 276 Computer Science
- 277 Earth, Environmental, and Marine Science
- 278 Economics
- 279 Education
- 280 Engineering
- 281 English
- 282 Foreign Language
- 283 History
- 284 Home Economics
- 285 Law
- 286 Mathematical Sciences
- 287 Medical Science

*** Postsecondary
- 288 Physical Education
- 289 Physics
- 290 Political Science
- 291 Psychology
- 292 Social Work
- 293 Sociology
- 294 Theology
- 295 Trade and Industrial
- 296 OTHER health specialties
- 297 OTHER natural sciences
- 298 OTHER social sciences
- 299 OTHER Postsecondary

Other Professions

401 Construction trades, miners & well drillers
402 Mechanics and repairers
403 Precision/production occupations (e.g., metal workers, woodworkers, butchers, bakers, printing occupations, tailors, shoemakers, photographic process)
404 Operators and related occupations (e.g., machine set-up, machine operators and tenders, fabricators, assemblers)
405 Transportation/material moving occupations

500 **Other Occupations (Not Listed)**
501 **Teaching in non-school setting**
502 **Legal technician**

Exhibit 4. NSF occupational code categories for tabulations

1. Computer and mathematical scientists

11 Computer and information scientists 052–055, 088
12 Mathematical scientists 172–174, 176
13 Postsecondary teachers in computer and mathematical sciences 276, 286

2. Life and related scientists

21 Agricultural and food scientists 021
22 Biological scientists 022, 023, 025, 027
23 Environmental life scientists including forestry scientists 024
24 Postsecondary teachers in life and related sciences 273, 271, 287, 297

3. Physical scientists

31 Chemists, except biochemists 193
32 Earth scientists, geologists, and oceanographers 192, 194, 195
33 Physicists and astronomers 191, 196
34 Other physical scientists 198
35 Postsecondary teachers in physical and related sciences 289, 277, 275

4. Social and related scientists

41 Economists 232
42 Political scientists 235
43 Psychologists 236
44 Sociologists and anthropologists 231, 237
45 Other social scientists 238, 233
46 Postsecondary teachers in social and related sciences 278, 291, 290, 293, 298

5. Engineers

51 Aerospace and related engineers 082
52 Chemical engineers 085
53 Civil and architectural engineers 086
54 Electrical, electronic, computer, and communications engineers 087, 089
55 Industrial engineers 091
56 Mechanical engineers 094
57 Other engineers 083, 084, 090, 092–093, 095–097, 099, 098
58 Postsecondary teachers in engineering 280

6. All other occupations (occupations other than S&E)

61 Managers and related occupations 141, 151–153
62 Health and related occupations 111–114
63 Educators other than science and engineering postsecondary 253–254, 251, 252, 255–257, 272, 274, 279, 281–285, 288, 292, 294–296, 299
64 Social services and related occupations 240, 070, 040
65 Technicians, including computer programmers 026, 175, 197, 100–104, 081, 051
66 Sales and marketing occupations 200–203
67 Other occupations 010, 031–033, 120, 130, 110, 500 (501–502), 171, 234, 221–223, 401–405

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995

ELIGIBLE SCIENCE AND ENGINEERING FIELDS

		1995 NSF Code	1990 CIP Code
1.	**Computer and mathematical sciences**		
11	Computer & info sciences		
	Computer & info sciences, general	671	11.0101
	Computer science	673	11.0701
	Computer systems analysis	674	11.0501
	Information sciences & systems	676	11.0401
	Computer & info sciences, other	677	11.9999
12	Mathematical sciences		
	Applied mathematics, general	841	27.0301
	Applied mathematics, other	841	27.0399
	Mathematics	842	27.0101
	Operations research	843	27.0302
	Mathematical statistics	844	27.0501
	Mathematics, other	845	27.9999
	Mathematics & computer science	845	30.0801
2.	**Life and related sciences**		
21	Agricultural & food sciences		
	Animal sciences	605	02.0201–02.0299
	Food sciences & technology	606	02.0301
	Plant sciences	607	02.0401–02.0499
	Soil science	608	02.0501
	Agricultural sciences, other	608	02.9999
	Agricultural sciences, general	608	02.0101–02.0102
22	Biological sciences		
	Biochemistry & biophysics	631	26.0202–26.0203
	Biology, general	632	26.0101
	Botany	633	26.0301–26.0399
	Cell & molecular biology	634	26.0401–26.0499
	Ecology	635	26.0603
	Genetics, plant & animal	636	26.0613
	Microbiology/bacteriology	637	26.0501
	Nutritional sciences	638	26.0609
	Pharmacology, human & animal	639	26.0705
	Physiology, human & animal	640	26.0706
	Zoology, general	641	26.0701
	Entomology	641	26.0702
	Pathology, human & animal	641	26.0704
	Zoology, other	641	26.0799
	Anatomy	642	26.0601

		1995 NSF Code	1990 CIP Code
22	Biological sciences (continued)		
	Marine/aquatic biology	642	26.0607
	Neuroscience	642	26.0608
	Parasitology	642	26.0610
	Radiation biology/radiobiology	642	26.0611
	Toxicology	642	26.0612
	Biometrics	642	26.0614
	Biostatistics	642	26.0615
	Biotechnology research	642	26.0616
	Evolutionary biology	642	26.0617
	Biological immunology	642	26.0618
	Virology	642	26.0619
	Misc biological spec, other	642	26.0699
	Biological sciences, other	642	26.9999
	Biological & physical sciences	991	30.0101
	Systems science & theory	991	30.0601
23	Environmental & forestry science		
	Environmental science/studies	680	03.0102
	Forestry sciences	681	03.0502
3.	**Physical and related sciences**		
31	Chemistry		
	Chemistry	873	40.0501–40.0599
32	Earth science, geology, ocean		
	Atmospheric science & meteorology	872	40.0401
	Earth & planetary sciences	874	40.0703
	Geology	875	40.0601
	Geochemistry	876	40.0602
	Geophysics & seismology	876	40.0603
	Paleontology	876	40.0604
	Geological sciences, other	876	40.0699
	Oceanography	877	40.0702
33	Physics & astronomy		
	Astronomy	871	40.0201
	Astrophysics	871	40.0301
	Physics	878	40.0801–40.0899
34	Other physical sciences		
	Physical sciences, general	879	40.0101
	Metallurgy	879	40.0701
	Misc physical sciences, other	879	40.0799

		1995 NSF Code	1990 CIP Code
4.	**Social sciences and related sciences**		
41	Economics		
	Agricultural economics	601	01.0103
	Economics	923	45.0601-45.0699
42	Political & related sciences		
	Public policy analysis	902	44.0501
	International relations & affairs	927	45.0901
	Political science & government	928	45.1001–45.1099
43	Psychology		
	Educational psychology	704	13.0802
	Clinical psychology	891	42.0201
	Counseling psychology	892	42.0601
	Experimental psychology	893	42.0801
	Psychology, general	894	42.0101
	Industrial/organizational psych	895	42.0901
	Social psychology	896	42.1601
	Psychology, other	897	42.9999
	Cognitive psychology/psycholing	897	42.0301
	Community psychology	897	42.0401
	Developmental & child psychology	897	42.0701
	Physiological psychology	897	42.1101
	School psychology	897	42.1701
	Biopsychology	897	30.1001
44	Sociology & anthropology		
	Anthropology	921	45.0201
	Archeology	921	45.0301
	Criminology	922	45.0401
	Sociology	929	45.1101
45	Other social sciences		
	Area studies	620	05.0101–05.0199
	Ethnic & cultural studies	620	05.0201–05.0299
	Area, ethnic, cultural, other	620	05.9999
	Linguistics	771	16.0102
	Philosophy of science	861	45.0804 (PART)
	Geography	924	45.0701–45.0702
	History of science	925	45.0804 (PART)
	Urban affairs/studies	930	45.1201
	Social sciences, other	930	45.9999
	Social sciences, general	930	45.0101
	Demography/population studies	930	45.0501
	Peace & conflict studies	930	30.0501
	Gerontology	930	30.1101
	Science, technology, & society	930	30.1501

		1995 NSF Code	1990 CIP Code
5.	**Engineering**		
51	Aero & astro engineering		
	Aero & astro engineering	721	14.0201
52	Chemical engineering		
	Chemical engineering	725	14.0701
53	Civil & architectural engineering		
	Civil engineering	726	14.0801–14.0899
	Architectural engineering	723	14.0401
54	Electrical & computer engineering		
	Computer engineering	727	14.0901
	Systems engineering	727	14.2701
	Electric, electron, comm engineering	728	14.1001
55	Industrial engineering		
	Industrial/manufacturing engineering	733	14.1701
56	Mechanical engineering		
	Mechanical engineering	735	14.1901
57	Other engineering		
	Agricultural engineering	722	14.0301
	Bioengin & biomed engineering	724	14.0501
	Engineering mechanics	729	14.1101
	Engineering physics	729	14.1201
	Engineering science	729	14.1301
	Environmental engineering	730	14.1401
	Engineering, general	731	14.0101
	Geophysical engineering	732	14.1601
	Materials engineering	734	14.1801
	Ceramic sciences & engineering	734	14.0601
	Textile sciences & engineering	734	14.2801
	Polymer/plastics engineering	734	14.3201
	Metallurgical engineering	736	14.2001
	Mining & mineral engineering	737	14.2101
	Naval arch & marine engineering	738	14.2201
	Nuclear engineering	739	14.2301
	Petroleum engineering	740	14.2501
	Engineering design	741	14.2901
	Engin/industrial management	741	14.3001
	Materials science	741	14.3101
	Geological engineering	741	14.1501
	Ocean engineering	741	14.2401
	Engineering, other	741	14.9999

INELIGIBLE NON-SCIENCE AND NON-ENGINEERING FIELDS

Categories and Fields	1995 NSF Code	1990 CIP Code
Other, agri-business & manage	602	01.0101–01.0102
Other, agri-business & manage	602	01.0104–01.9999
Architecture	610	ALL 04
Business management	651–659	ALL 08, ALL 52
communications	661–663	ALL 09
Computer programming	672	11.0201
Data processing technology	675	11.0301
Other, conservation	682	03.0101
Other, conservation	602	03.0201–03.0501
Other, conservation	602	03.0506–03.9999
Criminal justice/protect services	690	ALL 43
Education	701–703	ALL 13 EXCEPT 13.0802
Education	705–713	ALL 13 EXCEPT 13.0802
Engineering-related tech	751–754	ALL 15
Engineering-related tech	751–754	48.0101–48.0199
English language, literature	760	ALL 23
Other, foreign language	772	16.0101
Other, foreign language	772	16.0103–16.9999
Health professions	781–791	ALL 51
Home economics	800	ALL 19, ALL20
Law/prelaw/legal studies	810	ALL 22
Liberal arts	820	ALL 24
Library science	830	ALL 25
Parks, recreation, leisure	850	ALL 31
Other, philosophy, religion	862	ALL 38, ALL 39
Public administration	901	44.0401
Other, public affairs	903	44.0201,44.9999
Social work	910	44.0701
History, other	926	45.0801–45.0803
History, other	926	45.0805–45.0899
Visual & performing arts	941–944	ALL 50
Other fields	995	ALL 10, ALL 12
Other fields	995	29.0101
Other fields	995	30.1201
Other fields	995	30.1301
Other fields	995	30.1401
Other fields	995	30.9999
Other fields	995	ALL 32 THRU 37
Other fields	995	ALL 41, ALL 46, ALL 47
Other fields	995	48.0201–48.9999
Other fields	995	ALL 49